

## CLAIMS

### What is claimed is:

1. An apparatus detecting reflection images from microarray biochip with sidewall, comprising:
  - 5 a carrier, carrying a plurality of microarray biochips;
  - an optical module, scanning the biochips; and
  - a movable system, carrying the carrier and/or the optical module respectively in a first direction and/or a second direction to achieve relative movement so that all the biochips are scanned;
- 10 wherein the optical module comprising:
  - at least a white light source, irradiating on the biochips;
  - at least a reflective lens, adjusting a light path of a reflected light from the biochips;
  - at least a linear CCD (Charge Coupled Device), receiving the reflected light to retrieve images from the biochips; and
  - 15 at least a focus lens, focusing the reflected light to the CCD.
2. The apparatus of claim 1, wherein the optical module further comprises a dichroic mirror located between the white light source and the biochips.
3. The apparatus of claim 1, wherein the carrier is for carrying a microtitre plate having a plurality of wells with sidewalls, the shape of each of the wells is circle or square.
- 20 4. The apparatus of claim 3, wherein the number of wells is 3, 24 or 96.
5. The apparatus of claim 1, wherein the movable system comprises a sliding rail

module and a tray sub-module for respectively carrying the optical module and the carrier.

6. The apparatus of claim 5, wherein the sliding rail module further comprises at least a sliding rail, a rail frame, and a belt/gear set.

7. The apparatus of claim 5, wherein the tray sub-module further comprises a tray, a  
5 drawer and a cartridge.

8. The apparatus of claim 1 further comprising a computer program used to compare the image data with pre-defined patterns.

9. A method of retrieving and analyzing reflection images from microarray biochips, comprising the steps of:

10 moving an optical module and a carrier carrying a plurality of biochips thereon respectively in a first direction and a second direction to achieve relative movement and retrieve images data from all the biochips, the optical module having a linear CCD(Charge Coupled Device) and a white light source;

transforming the image data to a computer; and

15 comparing the image data with a plurality of pre-defined patterns.

10. The method of claim 9, wherein one of the optical module and the carrier moves in the first direction, and the other moves in the second direction.

11. The method of claim 10, wherein the optical module and the carrier move relatively via the steps comprising:

- 20 a) the optical module moving in the first direction, meanwhile the linear CCD retrieving images from the biochips on a first half portion of the carrier;
- b) the carrier moving in the second direction to reach a second half portion of the carrier;

- c) the optical module moving in a direction opposite to the first direction in step a), meanwhile the linear CCD retrieving images from the biochips on a second half portion of the carrier; and
- d) the carrier moving in a direction opposite to the second direction in step b) to reach its initial position.

12. The method of claim 10, wherein the optical module and the carrier move relatively via the steps comprising:

- a) the carrier moving in the first direction, meanwhile the linear CCD retrieving images from the biochips on a first half portion of the carrier;
- b) the optical module moving in the second direction to reach a second half portion of the carrier;
- c) the carrier moving in a direction opposite to the first direction in step a), meanwhile the linear CCD retrieving images from the biochips on a second half portion of the carrier; and
- d) the optical module moving in a direction opposite to the second direction in step b) to reach its initial position.

13. The method of claim 9, wherein one of the carrier and the optical module is fixed, and the other moves in the first and the second directions, the relative movement of the optical module and the carrier comprising the steps of:

- a) the optical module and the carrier moving relatively to each other in the first direction, meanwhile the linear CCD retrieving images from the biochips on a first half portion of the carrier;
- b) the optical module and the carrier moving relatively to each other in the second direction so that the optical module reaches a second portion of the carrier;

- c) the optical module and the carrier moving relatively in a direction opposite to the first direction in step a), meanwhile the linear CCD retrieving images from the biochips on the second portion of the carrier; and
- d) the optical module and the carrier moving relatively to each other in a direction  
5 opposite to the second direction in step b) to reach their initial position.

14. The method of claim 9, wherein the comparing step of the image data is performed steps via a computer program comprising the steps of:

- retrieving the image data from the biochips sequentially;
- finding a plurality of dots constituting microarrays in the image data;
- 10 comparing the dots with the patterns having pre-defined features and stored in a database;
- and
- producing a comparison result.